a value different from the value of said same charge state number in any of the other sub-populations of said plurality of sub-populations included in said population of ions,

the charge state number of the ions in the most populous of said sub-populations having a value intermediate between the largest and smallest values of charge state numbers in the other and less populous sub-populations of said population of multiply charged polyatomic ions.

Claim 201 (new). A composition of matter as in claim 200 in which the charge state number of the ions in the most populous sub-population of said plurality of sub-populations is at least four.

Claim 202 (new). A composition of matter as in claim 200 in which the charge state number of the ions in the most populous sub-population of said plurality of sub-populations is at least five.

Claim 203 (new). A composition of matter as in claim 200 in which the charge state number of the ions in the most populous sub-population of said plurality of sub populations is at least seven.

Claim 204 (new). A composition of matter as in claim 200 in which said plurality of sub-populations includes one sub-population of ions for each value of charge state number beginning with a smallest value not less than three and extending to a largest value not less than eight.

Claim 205 (new). A composition of matter as in claim 200 in which said distinct polyatomic parent molecular species contains atoms of at least four different elements.

Claim 206 (new). A composition of matter as in claim 200 in which said distinct polyatomic parent molecular species is taken

from that class of compounds known as biopolymers.

Claim 207 (new). A composition of matter as in claim 200 in which said distinct polyatomic parent molecular species is from the class of compounds that includes peptides, proteins, glycoproteins, carbohydrates, and oligonucleotides.

Claim 208 (new). A composition of matter comprising one or more populations of multiply charged polyatomic ions derived from a sample containing one or more polyatomic parent molecular species, the number of charges on each ion defining said ion's charge state number, at least one of said one or more populations of multiply charged polyatomic ions having been formed from at least one of said one or more polyatomic parent molecular species in said sample,

said at least one of said one or more populations of multiply charged polyatomic ions formed from said at least one of said one or more polyatomic parent molecular species in said sample, comprising a plurality of sub-populations, the ions of each of said sub-populations having the same charge state number which differs in value from the charge state numbers of any of the other sub-populations in said plurality of sub-populations, the ions of the most populous of said sub-populations having a value of said charge state number that is at least four and is intermediate between the smallest and largest values of charge state number in the other and less populous sub-populations of ions formed from said at least one of said one or more polyatomic parent molecular species in said sample.

Claim 209 (new). A composition of matter as in Claim 208 in which the charge state number in the most populous of said sub-

populations that is intermediate in value between the smallest and largest values of charge state number in the other and less populous sub-populations has a value of at least five.

Claim 210 (new). A composition of matter comprising a mixture of gaseous ions in which the ions formed from a sufficiently large polyatomic parent molecular species containing atoms of at least four different elements comprise a set of multiply charged ions, the number of charges on any one of such multiply charged ions in said set defining that ion's charge state number,

said set of multiply charged ions containing ions in each of a plurality of charge states such that the ion abundance in each charge state of said plurality of charge states in said set increases with increasing charge state number up to and including some critical value of charge state number above which the ion abundance in each charge state decreases with further increases in charge state number, said critical value of charge state number being four.

Claim 211 (new). A composition of matter as in Claim 210 in which the critical value of charge state number, above which ion abundances decrease with increasing charge state number, is five.

Claim 212 (new). A composition of matter as in Claim 210 in which the critical value of charge state number, above which ion abundances decrease with increasing charge state number, is seven.

Claim 213 (new). A composition of matter as in Claim 210 in which the sufficiently large polyatomic parent molecular species containing atoms of at least four different elements is from the class of compounds known as biopolymers.

Claim 214. A composition of matter as in Claim 210 in which

the sufficiently large polyatomic parent molecular species containing atoms of at least four different elements is from the class of compounds that includes peptides, proteins, oligonucleotides, carbohydrates, nucleic acids and glycoproteins.rbohydrates, nucleic acids and glycoproteins.

SUPPORTING REMARKS

The multiply charged polyatomic ions that the applicant and his co-inventors discovered in their research on electrospray ionization clearly constitute a new composition of matter. To obtain adequate patent protection for this discovery requires the formulation of claims that clearly and sufficiently distinguish the multiply charged ions from ions known in the prior art. Applicant's previously drawn claims have attempted to achieve this distinction primarily in terms of the claimed ions all having at least some minimum number of charges and being distributed over a coherent sequence of charge states that differ by one charge from the next highest or lowest charge occupied charge state. Thus, for example, we claim as novel a population of ions formed from some parent molecule M, in which there are ions consisting of M with say 7, 8, 9, 10, 11, 12, 13 and 14 charges. By specifying that the ions are polyatomic we avoid nominal anticipation by long-known ions comprising atoms which have been stripped of various numbers of external electrons to produce atomic ions with a similar sequence of charge states differing by one charge. Multiply charged polyatomic ions have been produced by other techniques such as Thermospray and Laser desorption but never with so many charges per ion or with such an extensive range of charge states. Thus, to distinguish the